

## Regional Integration and Farm Household Adjustment

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By focusing on the adjustment problems of farm households, this article pursues a different approach to the challenge of regional integration than the other articles in this publication. The other articles consider the aggregate or sectoral impacts of integration: How will U.S. agricultural exports or imports change? How will investment flows shift? How will GDP growth change? These are important questions, and the economic tools employed to answer them require making some simplifying assumptions about the structure of the economy and the structure of agriculture. Such models treat the economy and the sectors within it as one big firm, or, equivalently, the summation of millions of identical “representative firms.” For agriculture, one models how a representative farm will react to potential changes in the economic environment. For statements and inferences about the economy or the sector *as a whole*, the representative farm, firm, or household assumption works reasonably well. However, if one wishes to examine the impact of integration at a finer level of detail, the representative agent assumption leads to problems: there frequently is not sufficient information to render accurate disaggregated results (Kirman, 1992).

This article looks beyond the representative farm to examine the diversity of U.S. farm households. This disaggregated information complements the aggregate analysis of the other chapters. Analysis of the distributional effects of regional integration for farm households is a new research topic with, at present, few definitive answers. The information presented here is used to frame the important questions and indicate what kinds of farm households are the most likely to benefit from integration and which are at greatest risk of financial failure.

Several themes are elaborated in this article. First, there is a wide variety of farm households, and their capacity to adjust varies accordingly. Second, agricultural adjustment is systematically different from

adjustment for most other sectors of the economy because of the structure of farm households. Farm households differ significantly from nonfarm households: their assets, including their skills, land, and equipment, tend to be more sector-specific than those of nonfarm households. Third, how a farm household will fare following integration depends on both its *commodity exposure* (what the farm can produce profitably), and its *asset exposure* (the tenure (ownership versus rental), leverage, sector specificity and diversification of its assets).

### Commodity Exposure

Regional integration may, for example, reduce the price of vegetables relative to the price of grains. The increase in the relative price of grains will induce a shift of land and other resources into grain production and out of vegetable production. If we assume that the farm sector is simply one big representative farm the adjustment seems smooth. At the farm level, however, problems can emerge.

First, consider that few if any farms are significant commercial producers of both grains and vegetables. Modern agriculture tends toward specialization at the farm level, yielding increased variety at the sectoral level. Consider a specialized grain farm. Integration increases the price of grains relative to vegetables, but suppose it also increases the price of corn relative to the price of soybeans. The grain farm simply changes its crop mix, planting a few more acres to corn and a few less to soybeans. The adjustment might require some minor changes in farm equipment and input purchases, but these are neither particularly difficult nor expensive.

Because the prices of both corn and soybeans rise relative to pre-integration levels, the value of grain-producing farmland increases. If the household owns or has equity in the land, it will enjoy an unrealized capital gain. Such an increase in net worth may make

it easier to finance adjustment and expansion. If the household rents the land, it will likely face higher rents. Thus the household must share some of the gain in sales with the the landowner; still, the returns to the farmer's skills and experience in growing corn and soybeans are likely enhanced. For the stylized grain farm, adjustment to our assumptions about integration is relatively easy and profitable.

Now consider the case of a vegetable producer. At the time of integration, the farm specializes in tomato production, with considerable fixed investments in specialized equipment. The next best use of the farm is to produce peppers. By assumption, the price of all vegetables has fallen relative to pre-integration levels, and the price of tomatoes has fallen relative to the price of peppers. Conversion to pepper production requires considerable new investment. Some of the tomato equipment can be adapted for peppers, but some will have to be sold, likely at a substantial discount because of the decline in tomato prices.

Because of the decline in vegetable prices, a landowning household suffers a decline in its net worth. This decline may be substantial if the land is heavily mortgaged (leveraged), and it may prove difficult, if not impossible, to finance the conversion to an alternative crop. A renting household escapes the fall in land values and benefits from lower rents, but the lower product price means that returns to the household's specialized vegetable farming skills will likely erode. For the stylized vegetable farm, adjustment to this integration scenario is difficult and results in a decline in household income and net worth. Indeed, for a farm household with a high debt/asset ratio, adjustment may force an exit from farm proprietorship.

### **Asset Exposure**

Assume that there are only two kinds of jobs in the economy: salary (or wage) jobs and self-employment. Salary or wage jobs compensate effort at a predetermined rate. Once one is in a salary position, one's income is relatively certain and, except for exceptionally good or bad performance, one's income and employment status do not change dramatically year to year. Most jobs in industrialized economies are either managerial, administrative, or service sector salary positions or wage positions in manufacturing where wages are typically determined collectively.

Self-employment compensates effort based on the value of one's sales or billings less one's costs. In addition to self-employed professionals, entrepreneurs, and most farmers, this category includes some sales positions. In contrast to salary compensation, self-employment exposes one to greater income uncertainty. Car sales, for example, depend in large part on who shows up at the showroom. If there is no customer, it is impossible to close a deal. Farmers can control the amount of land planted and the quality of cultivation, but weather and insects, among other factors, ultimately determine yield and output. Farmers are a special case of self-employment because the variance of farm product prices is, in general, greater than the variance of industrial prices, such as automobiles, men's suits, and insurance premiums. Moreover, the price of services (e.g., medical, accounting, repair) are even less variable than the price of goods.

Although agriculture accounts for only 2.5 percent of U.S. employment, the sector accounts for over one-seventh (14.4 percent) of all self-employment. Almost half of all those employed in agriculture are self-employed as opposed to only 7 percent of those working in the nonfarm sector.

### **Beyond the Representative Farm**

There are approximately 2 million farm operator households in the United States. Average income for farm households in 1996 was \$50,361, about 7 percent more than the average income of all U.S. households, at \$47,123. It is hardly surprising that the two averages are so similar, given that the average farm household derives only 16 percent of its income from farming activity, the other 84 percent comes from nonfarm employment and investment (see table 1). This is an excellent example of how uninformative averages can be.

USDA distinguishes between commercial farms (those with sales in excess of \$50,000) and noncommercial farms. This simple division of the farm household population into two groups yields much more information about the underlying diversity of farming. (For an even more detailed view see table 2.) Noncommercial farms constitute 74 percent of all farm households, but only 10 percent of total farm sales. The average noncommercial farm loses money from farming. Largely because of the loss from farming, noncommercial farm average household income is less than the U.S. household average. The representative commercial farm, in contrast, earns 55 percent of its income

**Table 1--Sources of farm operator household income, 1996**

	Noncom- mercial	Com- mercial	All
	<i>Percent</i>		
Share of farms	74	26	100
Share of farm sales	10	90	100
	<i>Dollars</i>		
Income source:			
Farming	<b>3,419</b>	<b>40,623</b>	<b>7,906</b>
Off-farm	45,418	33,897	42,455
Total	41,999	74,520	50,361
	<i>Percent</i>		
Distribution:			
Farming	<b>-8</b>	<b>55</b>	<b>16</b>
Off-farm	108	45	84
Total	100	100	100
Percent of average U.S. household income (\$47,123)	89	158	107

from farming activities and enjoys an income of \$74,519, about 60 percent more than the U.S. household average. Commercial farm households are also considerably wealthier than nonfarm households of comparable income or occupational status (table 3).

Farm households' wealth tends to be more sector specific than that of nonfarm households. First, the value or returns to a farmer's skills and effort on the farm (often called human capital) is largely determined by the price of farm output. These prices also determine the value of farmland and specialized farm equipment which constitute the bulk of farm households' net worth, particularly of commercial farms. As illustrated in the examples above, farm income and farm net worth tend to move in the same direction,

**Table 3--Balance sheet for average commercial farm operation**

	Assets	Liabilities	Ratio
	<i>Dollars</i>		<i>Percent</i>
Total	909,095	154,752	17
Current	155,103	59,390	38
Non-current	753,992	95,362	13
Land, buildings	557,639	75,178	13
Equipment, etc.	196,353	20,183	10
Net farm equity	754,343		

Source: USDA, ERS, 1996, Agricultural Resource Management Study.

Source: USDA, ERS, 1994, Farm Costs and Returns Survey  
(percent of farm sales).

compounding the impact of good or bad price movements. In contrast, nonfarm households' net worth is typically concentrated in home equity (principal residence) with the balance diversified among vehicles, retirement plans, equities, and certificates of deposit. None of these assets is highly correlated with the salary or wage rates of household members (table 4). Because farm households' core assets (land, buildings, and equipment) trade in markets that are often less liquid than the residential and financial assets of nonfarm households, their asset values tend to be more volatile. Moreover, farm assets are not easily divisible. Consequently, farmers often find themselves "land rich and cash poor."

The representative commercial farm is not highly leveraged; its average debt/asset ratio is 17 percent. Of course, behind this low average are many farms with no debt and a small proportion, 4 percent, with a high debt/asset ratio (above 70 percent). As 85 percent of commercial farms have a leverage ratio below 40 percent, the vast majority are financially capable of adjusting to a significant change in relative prices. The

**Table 2--Beyond the representative farm**

Farm sales	Farms	Distribution of farms	Average sales	Total sales	Distribution of sales
<i>\$1,000</i>	<i>Numbers</i>	<i>Percent</i>	<i>Dollars</i>	<i>\$ billions</i>	<i>Percent</i>
<10	985,158	48	3,146	3.1	2
-50	497,822	24	25,507	12.7	8
-100	211,132	10	76,530	16.2	11
-250	220,888	11	160,346	35.4	24
-500	73,100	4	350,792	25.6	17
-1,000	30,839	2	681,459	21.0	14
1,000	16,561	1	2,209,015	36.6	24
Total	2,035,500	100	73,995	150.6	100
Noncommercial	1,482,980	73		15.8	10
Commercial	552,520	27		134.8	90

**Table 4--Net worth and its composition, 1995**

U.S. households with income between \$25,000 - \$49,999			U.S. households with income between \$50,000 - \$99,999			Self-employed households		
Percent of all HH:	31.1		Percent of all HH:	20.2		Percent of all HH:	9.7	
Median	54,900		Median	121,200		Median	152,900	
Mean	119,300		Mean	256,000		Mean	731,500	

  

	Percent owning	Median Value		Percent owning	Median Value		Percent owning	Median Value
<b>Major Assets</b>			<b>Major Assets</b>			<b>Major Assets</b>		
<b>Nonfinancial</b>			<b>Nonfinancial</b>			<b>Nonfinancial</b>		
Vehicles	92.2	11,100	Vehicles	93.2	16,200	Vehicles	85.7	12,000
Residence	68.4	80,000	Residence	84.4	120,000	Residence	73.9	120,000
Investment RE	16.5	40,000	Investment RE	24.9	57,300	Investment RE	32.1	100,000
Business	9.8	26,300	Business	17.5	30,000	Business	58.0	71,000
<b>Financial</b>			<b>Financial</b>			<b>Financial</b>		
Bank account	94.7	2,000	Bank account	98.6	4,500	Bank account	91.3	4,400
Retirement	52.6	10,000	Retirement	69.8	23,000	Retirement	47.8	24,000
Life Insurance	33.1	5,000	Life Insurance	42.5	7,000	Life Insurance	41.5	6,000
Savings bonds	27.4	700	Savings bonds	39.9	1,200	Savings bonds	26.0	1,000
Stocks	14.3	6,900	Stocks	26.0	5,700	Stocks	18.8	17,500
CDs	13.7	10,000	CDs	15.6	13,000	CDs	18.6	15,000
Mutual funds	12.4	12,500	Mutual funds	20.9	15,000	Mutual funds	18.2	25,000

Source: Survey of Consumer Finances, 1995

Note: median value of asset is only of households which own such assets, not of all households.

only commercial farms at great financial risk due to adjustment are those with highly leveraged balance sheets *and* a high degree of exposure to products likely to fall in price after integration.

The adjustment prospects for noncommercial farm households are even more varied. Many of these households can be distinguished from nonfarm households only by their nominal engagement in farming. Clearly the adjustment to integration will also be nominal and pose no significant risk. Similarly, one might safely discount the adjustment problems of households engaged in farming primarily to reap tax benefits.

But there are many small farms that derive virtually all of their income from farming, although their gross sales are less than \$50,000; they are hardly noncommercial. Some of these farms may do a thriving business truck farming on the urban fringe. Even if highly leveraged, integration is unlikely to affect net worth because the conversion value to residential real estate probably determines land values. Similarly, for farm households with substantial nonfarm human capital, for example if one or both spouses have advanced off-farm skills, it is relatively easy to shift out of farming to a reasonable salary in town.

The most problematic small farms are households in relatively isolated or persistently poor rural areas. Changes in relative prices can cause significant adjustment problems. However, as economist Theodore Schultz argued over 50 years ago, rural poverty is not significantly alleviated through higher commodity prices (Schultz, 1945, 1949). Lower commodity prices may increase the burden of poverty, but the causes of rural household poverty are, principally, lack of skills, resources, and access to information and services (public and private). Even the most favorable changes in agricultural trade policy and international commodities flows will not alleviate these causes.

## Conclusion

The two linked diagrams in figure 1 summarize the arguments above. The upper diagram summarizes the grain and vegetable farm examples: how a farm household will fare following integration depends on both its commodity exposure and its asset exposure. In terms of asset exposure, renters are considered to have negative exposure and landowners to have positive exposure. Of the four combinations in the upper diagram, only the upper right quadrant is likely to face significant adjustment risk. The curved arrow expands these potential at-risk farms in the lower diagram.

The lower diagram shows how adjustment risk depends on a farm household's income diversification, in particular, its dependence on farm income and the farm's financial exposure, that is, its debt/asset ratio. Farms with high farm income dependency are at risk of liquidity problems and perhaps solvency problems. Of these farms, those with high leverage are at the greatest risk of insolvency (lower left quadrant).

### References

Kirman, Alan P. (1992) "Whom or what does the representative individual represent?" *Journal of Economic Perspectives* 6 (2): 117-136.

Schultz, Theodore W. (1945) *Agriculture in an Unstable Economy*, McGraw-Hill; (1949) *Production and Welfare of Agriculture*, Macmillan.

Figure 1  
**Summary of farm response to declines in commodity prices**

		Commodity exposure price effect	
		+	-
Asset exposure	+	Higher income, greater wealth	Lower income, less wealth
	-	Higher rent, higher income?	Lower rent, lower income?

  

		high	minimal
		Dependency on farm income	Dependency on farm income
Financial condition exposure	low leverage	Major decline in income and net worth, low risk of failure	Minor decline in income and net worth
	highly leveraged	Very high risk of failure	Minor decline in income, potential major decline in net worth